

AMENDMENT

(Under PCT Article 34)

TO: Examiner of the Patent Office: Kazuo Kouno

1. Identification of the International Application

PCT/JP2004/004546

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4. Item to be Amended:

Specification and Claims

5. Subject Matter of Amendment

(1) Page 5, line 24 "the interface of said steel sheet oxide particles of at" is amended to "the interface of said steel sheet oxide particles having an average diameter of the particle size of 0.001 to 1 μ m of at".

(2) Page 5, line 34 to page 6, line 1 is deleted.

(3) Page 6, line 13 "internal oxide" is amended to "oxide".

(4) Page 6, lines 24 to 27 are deleted.

(5) On pages 19 and 20, claims 1 to 6 are amended as attached.

6. Attachment

(1) New pages 5 and 6

(2) New pages 19, 19/1 and 20

wt%,

C: 0.05 to 0.40%,

Si: 0.2 to 3.0%, and

Mn: 0.1 to 2.5% and

5 further including at least one or two or more
types of:

P: 0.001 to 0.05%,

S: 0.001 to 0.05%,

Al: 0.01% to 2%,

10 B: 0.0005% to less than 0.01%,

Ti: 0.01% to less than 0.1%,

V: 0.01% to less than 0.3%,

Cr: 0.01% to less than 1%,

Nb: 0.01% to less than 0.1%,

15 Ni: 0.01% to less than 2.0%,

Cu: 0.01% to less than 2.0%,

Co: 0.01% to less than 2.0%,

Mo: 0.01% to less than 2.0%,

with the balance comprised of Fe and
20 unavoidable impurities, having on its surface a Zn
plating layer containing Al in a concentration of 0.01 to
1 wt% and the balance of Zn and unavoidable impurities
and containing inside the steel sheet within 2 μ m from
the interface of said steel sheet oxide particles having
25 an average diameter of the particle size of 0.001 to 1 μ m
of at least one type of oxide selected from an Al oxide,
Si oxide, Mn oxide, or complex oxide comprised of at
least two of Al, Si, and Mn.

(2) A high strength molten zinc plated steel sheet
30 as set forth in (1), characterized in that said oxide
particles are comprised of at least one of silicon oxide,
manganese oxide, aluminum oxide, aluminum silicate,
manganese silicate, manganese aluminum oxide, and
manganese aluminum silicate.

(3) A process of production of a high strength molten zinc plated steel sheet comprised of the ingredients described in (1) by a continuous molten zinc plating system, said process of production of a high strength molten zinc plated steel sheet characterized by making a heating temperature T at a recrystallization annealing step in a reducing furnace of said system 650°C to 900°C, passing the steel sheet through an atmosphere where a ratio $\text{PH}_2\text{O}/\text{PH}_2$ of the steam partial pressure PH_2O and hydrogen partial pressure PH_2 of the atmosphere of said reducing furnace is $1.4 \times 10^{-10} \times T^2 - 1.0 \times 10^{-7} \times T + 5.0 \times 10^{-4} \leq \text{PH}_2\text{O}/\text{PH}_2 \leq 6.4 \times 10^{-7} \times T^2 + 1.7 \times 10^{-4} \times T - 0.1$, forming an oxide of (1) at a region from the surface of the steel sheet to a depth of 2.0 μm , then performing molten zinc plating treatment.

(4) A process of production of a high strength molten zinc plated steel sheet as set forth in (4), characterized in that said oxide particles are comprised of at least one of silicon oxide, manganese oxide, aluminum oxide, aluminum silicate, manganese silicate, manganese aluminum oxide, and manganese aluminum silicate.

BRIEF DESCRIPTION OF DRAWINGS

FIG. 1 is a schematic view of an example of the cross-section of a molten zinc plated steel sheet of the present invention.

BEST MODE FOR CARRYING OUT THE INVENTION

The molten zinc plated steel sheet of the present invention is characterized by being provided with both a superior press formability and strength and by being

CLAIMS

1. (Amended) A high strength molten zinc plated steel sheet characterized by comprising a steel sheet including, by wt%,

5 C: 0.05 to 0.40%,
Si: 0.2 to 3.0%, and
Mn: 0.1 to 2.5% and
further including at least one or two or more
types of:

10 P: 0.001 to 0.05%,
S: 0.001 to 0.05%,
Al: 0.01% to 2%,
B: 0.0005% to less than 0.01%,
Ti: 0.01% to less than 0.1%,
15 V: 0.01% to less than 0.3%,
Cr: 0.01% to less than 1%,
Nb: 0.01% to less than 0.1%,
Ni: 0.01% to less than 2.0%,
Cu: 0.01% to less than 2.0%,
20 Co: 0.01% to less than 2.0%,
Mo: 0.01% to less than 2.0%,

with the balance comprised of Fe and
unavoidable impurities, having on its surface a Zn
plating layer containing Al in a concentration of 0.01 to
25 1 wt% and the balance of Zn and unavoidable impurities
and containing inside the steel sheet within 2 μ m from-
the interface of said having an average diameter of the
particle size of 0.001 to 1 μ m of at least one type of
oxide selected from an Al oxide, Si oxide, Mn oxide, or
30 complex oxide comprised of at least two of Al, Si, and Mn.

2. A high strength molten zinc plated steel sheet
as set forth in claim 1, characterized in that said oxide

particles are comprised of at least one of silicon oxide, manganese oxide, aluminum oxide, aluminum silicate, manganese silicate, manganese aluminum oxide, and manganese aluminum silicate.

5 3. (Deleted)

4. (Amended) A process of production of a high strength molten zinc plated steel sheet comprised of the ingredients described in claim 1 by a continuous molten zinc plating system, said process of production of a high strength molten zinc plated steel sheet characterized by making a heating temperature T at a recrystallization annealing step in a reducing furnace of said system 650°C to 900°C, passing the steel sheet through an atmosphere where a ratio $\text{PH}_2\text{O}/\text{PH}_2$ of the steam partial pressure PH_2O and hydrogen partial pressure PH_2 of the atmosphere of said reducing furnace is $1.4 \times 10^{-10} \times T^2 - 1.0 \times 10^{-7} \times T + 5.0 \times 10^{-4} \leq \text{PH}_2\text{O}/\text{PH}_2 \leq 6.4 \times 10^{-7} \times T^2 + 1.7 \times 10^{-4} \times T - 0.1$, forming an oxide of claim 1 at a region from the surface of the steel sheet to a depth of 2.0 μm , then performing molten zinc plating treatment.

5. A process of production of a high strength molten zinc plated steel sheet as set forth in claim 4, characterized in that said oxide particles are comprised of at least one of silicon oxide, manganese oxide, aluminum oxide, aluminum silicate, manganese silicate, manganese aluminum oxide, and manganese aluminum silicate.

6. (Deleted)